

Amendment
US Appl. No. 10/551,825
Attorney Docket No. PSA05003

REMARKS

As a preliminary, Applicant and Applicant's representative thank the Examiner for the interview that took place on September 18, 2008.

By the present amendment, claims 1 and 17 have been amended to change "for a combustion cycle" to "during a combustion cycle," as discussed at the interview. It is submitted that support for this change is immediate throughout the original specification.

Further, it is submitted that the amendment does not raise any new issues. Accordingly, entry and consideration of the amendment is respectfully requested.

Claims 1-23 are pending in the present application. Claims 1 and 17 are the only independent claims.

In the Office Action, claims 1-8 and 10-23 are rejected under 35 U.S.C. 103(a) as obvious over US 6,138,638 to Morikawa ("Morikawa") in view of US 6,543,409 to Bertsch et al. ("Bertsch").

Further, claim 9 is rejected under 35 U.S.C. 103(a) as obvious over Morikawa in view of Bertsch and further in view of US 3,526,212 to Bassot ("Bassot").

Reconsideration and withdrawal of the rejection is respectfully requested. As a preliminary, it is submitted that, contrary to the position set forth in the Office Action, method claims 17-23 do recite active steps such as, for example, "supplying an amount of gasoline to the injection means" as recited in claim 17.

Further, as explained at the interview, Bertsch discloses a modification of injection timing to address misfires phenomena (referring to Bertsch at col. 1, lines 44 and 60-65 and col.

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2, line 3 and lines 17-20, see page 4 of the Office Action). Specifically, misfires occur when the fuel-air mixture is not combusted. These misfire phenomena are frequent when the mixture is lean, for example, with partial load. Misfires result in loss of power and unburned fuel in the exhaust.

In contrast, the present invention is specifically intended to address clicking phenomena. Clicking corresponds to combustions that take place too early in the cycle, i.e., before the spark from the spark plug, and at a time when the piston is still in the ascending compression phase. These clicking phenomena are frequent when the mixture is rich, for example, with full load, which triggers early spontaneous combustion.

To substantiate and illustrate the differences between “misfire” and “clicking” phenomena, an excerpt from Bosch Automotive Handbook that discusses both phenomena is submitted with this paper.

Thus, the purpose of the system of Bertsch is completely different from the purpose of the system of the present invention.

In addition, Bertsch does not teach or suggest at least one partial injection delivered after ignition during the combustion cycle. Namely, it is clear to a person of the art that both injections of Bertsch must necessarily occur before ignition in the system of Bertsch, because they are intended to avoid a misfire. If the second injection of Bertsch were after ignition, not only this second injection would not help avoid a misfire, but such late injection would compound the problem of the misfire by providing additional unburned fuel to be exhausted.

In contrast, in the presently claimed invention, the amount of gasoline supplied by the pump to the injection means is fractionated in the form of a plurality of partial and distinct injections during a combustion cycle, and at least one of these partial injections is delivered before ignition of the load in the combustion chamber by the ignition means, and at least one partial injection is delivered after this ignition, as recited in present claims 1 and 17. Thus, during the combustion cycle, one injection is before ignition and the other injection is after ignition in this combustion cycle.

An advantage of this feature is that it is possible to avoid auto-ignition and to manage combustion so as to avoid or reduce clicking phenomena. More particularly, as discussed in the last response, an advantage of the present invention over Bertsch is that the second burst of partial injection after ignition makes it possible to effect quickly the formation of the air-gasoline mixture upstream of the flame front resulting from the combustion of the air-gasoline mixture prepared during the first burst of partial injections (as discussed in the present specification, for example, at page 5, lines 13-18). This further allows to maintain a relatively high ignition advance with the benefit of lower fuel consumption and ability to use cheaper ignition system.

This feature of the presently claimed invention and its advantages are not taught or suggested in Bertsch, which focuses on providing injections before ignition during the same combustion cycle, so as to avoid or reduce misfire phenomena rather than clicking phenomena. Further, the other cited references fail to remedy this deficiency of Bertsch, and a person of ordinary skill in the art would have had no motivation or other incentive to reach the features of

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the presently claimed invention. Therefore, the present claims are not obvious over the cited references taken alone or in any combination.

Further, regarding the dependent claims, the cited references fail to teach or suggest the combined features of each of these respective claims. Therefore, each of the dependent claims is not obvious over the cited references taken alone or in any combination.

In view of the above, it is submitted that the rejections should be withdrawn.

In conclusion, the invention as presently claimed is patentable. It is believed that the claims are in allowable condition and a notice to that effect is earnestly requested.

In the event there is, in the Examiner's opinion, any outstanding issue and such issue may be resolved by means of a telephone interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of the response period. Please charge the fee for such extension and any other fees which may be required to our Deposit Account No. 502759.

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Respectfully submitted,

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